National Aeronautics Space Administration
Goddard Space Flight Center

Flight Projects Directorate
Executive Briefing

INTRODUCTION

GODDARD SPACE FLIGHT CENTER OVERVIEW

NASA's first Space Flight Center was established in 1959

- Provides end-to-end Science and Technology Missions capabilities
- Integrates Science, Engineering, and Project Management
- Implemented nearly 300 missions – from the world's first weather satellite (1960) to Hubble Space Telescope servicing, James Webb Space Telescope, and beyond
- Develops and operates communication and navigation systems to meet NASA and National Program needs

Mission: We implement Earth, Space Science Communications and Technology Missions

- Conceive, develop, launch, and operate science and technology missions
- Address fundamental questions in Earth and Space Science
- Deliver data and information to the public in ways that they can use it

Our resources enable the accomplishment of our Mission

- Hire, develop, and nurture world class Scientists, Engineers, and Project Managers
- Provide in-house, hands on experience at the Center to foster employee development
- Evolve facilities to meet changing requirements
- Identify and aggressively pursue technology advancements that enable science breakthroughs

Source: NASA GSFC Overview

INTRODUCTION

GODDARD LOCATIONS

GREENBELT – MAIN CAMPUS
Greenbelt, MD

Develops and operates unmanned scientific spacecraft. Manages many of NASA's Earth observation, astronomy, and space physics missions

WALLOPS FLIGHT FACILITY
Wallops Island, VA

Manages and implements suborbital research programs at NASA's only launch range. Launches low-cost, versatile suborbital and orbital rockets, balloons, and aircraft in support of Goddard Earth , space science research, and human exploration missions

GODDARD INSTITUTE FOR SPACE STUDIES
New York City, NY

Provides critical perspective for monitoring global climate and developing an understanding of Earth systems

INDEPENDENT VERIFICATION AND VALIDATION FACILITY
Fairmont, WV

Provides elaborate testing on software to ensure computer programs developed for missions operate perfectly

WHITE SANDS GROUND TERMINAL
Las Cruces, NM

Provides ground terminals for data downlink from Space Network (SN) assets and command and control of SN

Source: NASA GSFC Overview

INTRODUCTION

FLIGHT PROJECTS' GODDARD SPACE FLIGHT CENTER RESOURCES

GSFC Engineering Facilities

- Vibration Test
- Acoustic Test
- Modal Survey Test
- Thermal Vacuum Test
- EMI/EMC Test
- High Capacity Centrifuge
- Static Test
- Mass Prop Measurement
- Clean Room Integration Areas

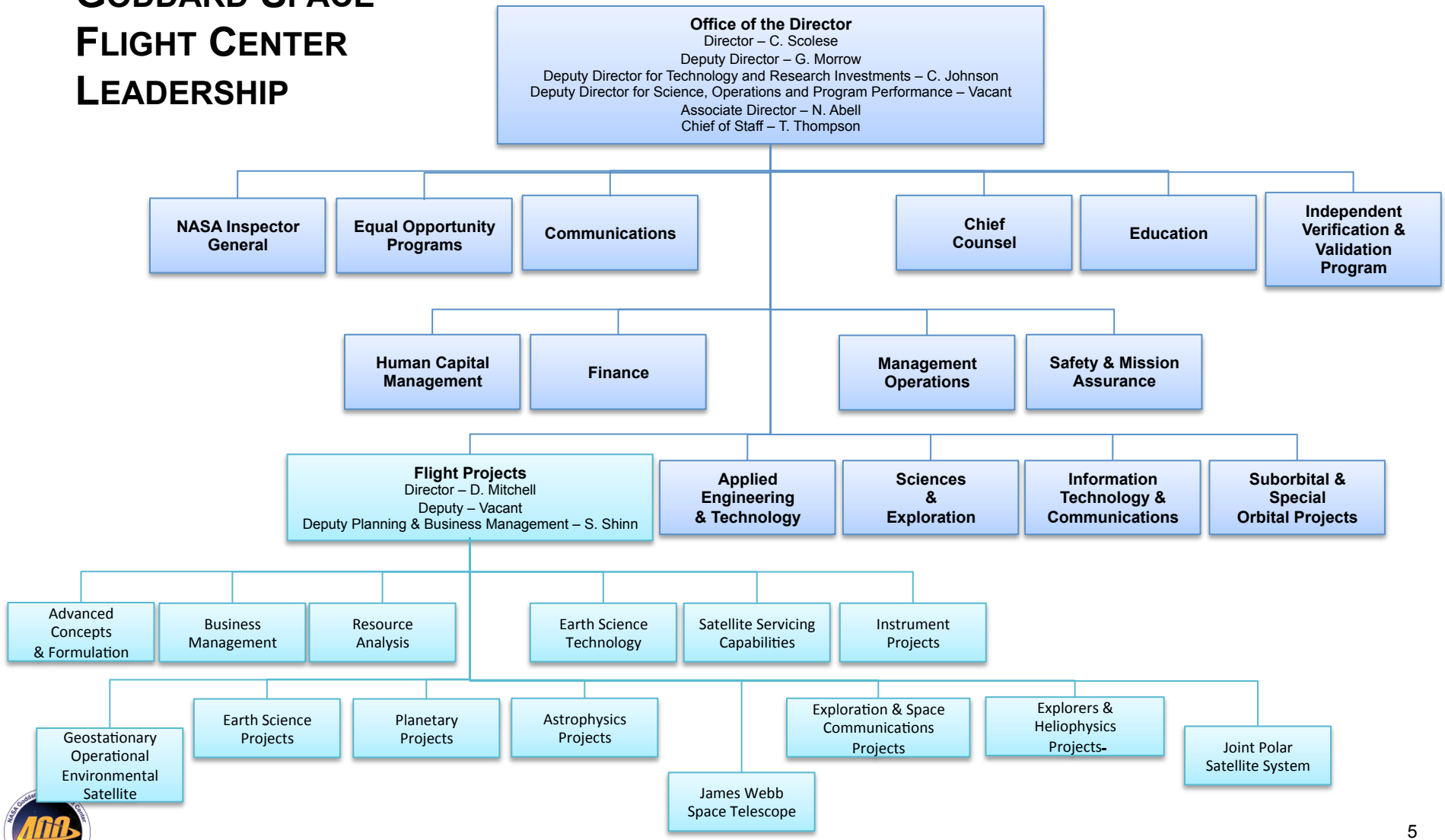
GSFC Science and Exploration Facilities

- Balloon Payload Integration High Bay
- Center for Climate Simulation Facility
- Visual and Technical Arts Laboratory
- Radiometric Calibration and Development Facility
- Snow and Ice Research Facility

As well as various laboratories specialized for assorted sciences including Earth, Astrophysics, Heliophysics, and the Solar System

MISSION AND ORGANIZATION

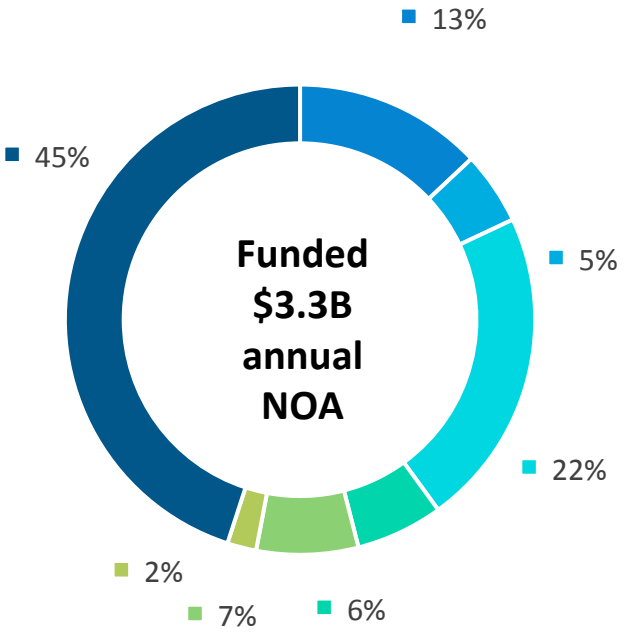
GODDARD SPACE FLIGHT CENTER LEADERSHIP



Source: GSFC Office of Communications

FLIGHT PROJECTS OVERVIEW

OUR FY 2015 ANNUAL PORTFOLIO



Earth Science Reimbursable – 45%
FY14 NOA: $1,510M
Projects in Development: 3
Total in Operations: 1

Earth Science – 13%
FY14 NOA $414.6M
Projects in Development: 5
Total in Operations: 12

Planetary – 5%
FY14 NOA: $169.7M
Projects in Development: 1
Total in Operations: 1

Astrophysics – 22%
FY14 NOA: $716.7M
Projects in Development: 4
Total in Operations: 4

Heliophysics – 6%
FY14 NOA: $184.7M
Projects in Development: 8
Total in Operations: 18

Communications & Navigation – 7%
FY14 NOA: $227.4M
Projects in Development: 3
Total in Operations: 5*
**Includes NIMO and SAR*

Cross-cutting Technologies – 2%
FY14 NOA: $61.9**
Projects in Development: 3
Total in Operations: 1

FPD WORKFORCE

- 408 Civil Service Employees
- 859 contractors

- 1,267 Total Employees

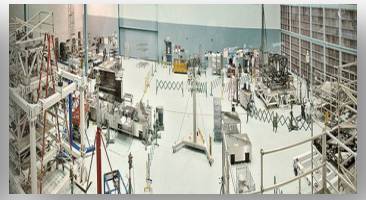
FLIGHT PROJECTS OVERVIEW

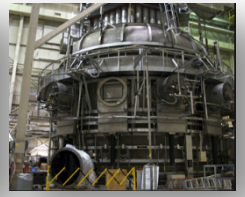
FLIGHT PROJECTS' SERVICES

Flight Projects Directorate is responsible for overall management and implementation of flight, ground, and instrument projects at Goddard Space Flight Center

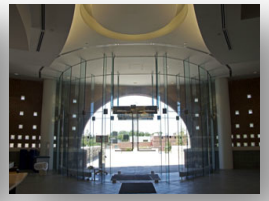

IDEA


DESIGN


FORMULATION/ INTEGRATION


TEST


LAUNCH


OPERATIONS


DATA ANALYSIS

FUNCTION	DESCRIPTION OF SERVICES
Leadership	Deliver vision, context and enable performance to achieve customer needs
Technical Expertise	Direct and train team of technical experts through formulation and implementation
Mission Development	Manage mission formulation and implementation for both in- and out-of-house
Project Control	Provide planning, resource management, and the latest methods, tools, and practices
Monitoring & Guidance	Assess performance; guide consistency, effectiveness, timeliness, and accountability
Advocacy	Liaise with external stakeholders on behalf of flight projects
Compliance & Control	Execute project activities in accordance with Center, Agency, and Federal standards
Mission Support	Offer mission support services for Space and Earth Science flight projects/missions
Knowledge Management	Recognize, collect, represent, and enable the delivery of and adoption of insights and experiences that will improve performance

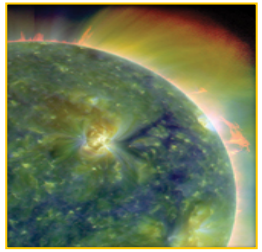
Source: NASA GSFC Overview

FPD PORTFOLIO

MAJOR CHAMPIONS

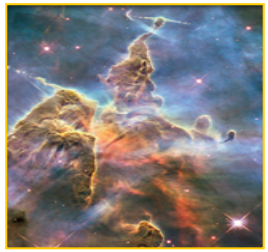
Science Mission Directorate (SMD)

Earth



Heliophysics

Planetary



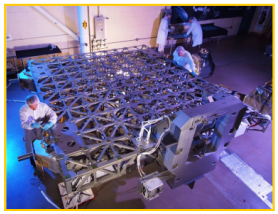
Astrophysics

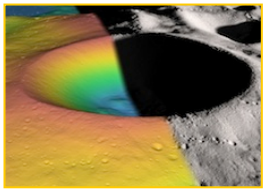
Human Exploration and Operations Mission Directorate (HEOMD)

Exploration Studies

Space Communications

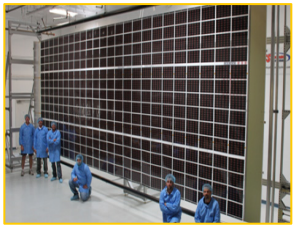
International Space Station





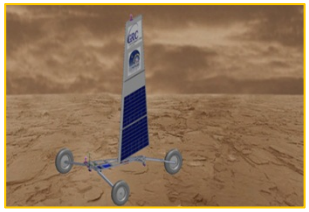
Lunar Science

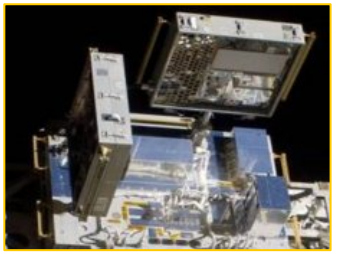
Science Technology Mission Directorate (STMD)



Building

Testing





Flying

Source: GSFC Code 400 Orientation Package

FPD PORTFOLIO

MAJOR CUSTOMERS (EXTERNAL)

Contractors, Government and Industry

esa

JPL Jet Propulsion Laboratory

NOAA National Oceanic and Atmospheric Administration U.S. Department of Commerce

CSA ASC

JAXA

NORTHROP GRUMMAN

BOEING

ATK ATK SPACE SYSTEMS

LOCKHEED MARTIN

ITT

Ball

Honeywell

GENERAL DYNAMICS

Academia

University of Maryland 18 56

APL The Johns Hopkins University APPLIED PHYSICS LABORATORY

UF University of Florida

MIT Massachusetts Institute of Technology

The University of Arizona

LASP Laboratory for Atmospheric and Space Physics University of Colorado Boulder

Southwest Research Institute

Mission Portfolio

As of 3.3.2014

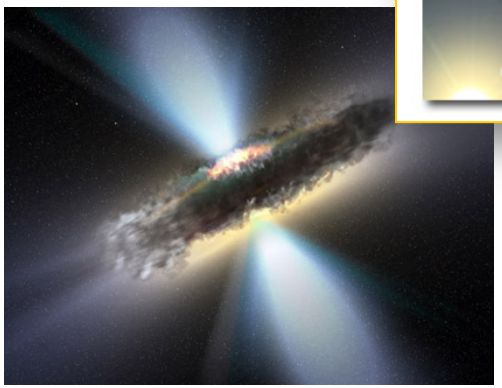
FPD PORTFOLIO

ASTROPHYSICS LINE OF BUSINESS

-An Amazing Legacy for Astrophysics: Hubble, JWST, and More!

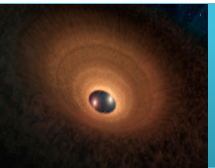
HUBBLE serves thousands of scientists all over the world and has transformed our view of the Universe

JAMES WEBB SPACE TELESCOPE *will study every phase in the history of our Universe; luminous glows after the Big Bang, to the formation of solar systems, to the evolution of our own Solar System*



FERMI GAMMA-RAY SPACE TELESCOPE allows study on how black holes can be accelerated jets of gas outward at fantastic speeds

…and many other operating missions

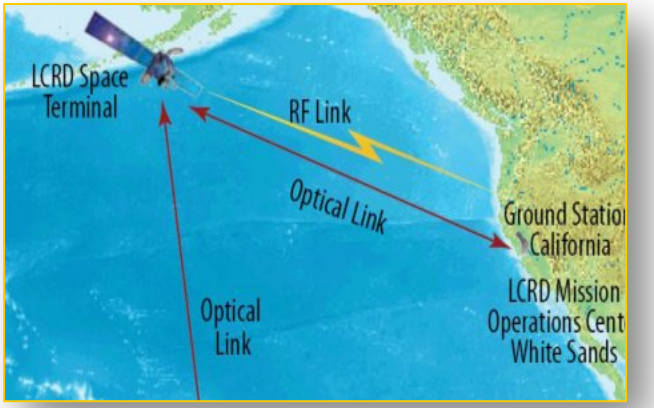


LINE OF BUSINESS OVERVIEW: *MISSION DEVELOPMENT AND MANAGEMENT TO EXPLORE FOR ANSWERS TO SOME OF THE MOST FUNDAMENTAL QUESTIONS REGARDING PHYSICAL FORCES AND LAWS OF THE UNIVERSE*

TECHNOLOGIES: TELESCOPE DEVELOPMENT; BUILD OF POWERFUL FUTURE FACILITIES; X-RAY ASTRONOMY AND GRAVITATIONAL WAVE OBSERVATORIES

FPD PORTFOLIO

COMMUNICATION AND NAVIGATION LINE OF BUSINESS



LASER COMMUNICATIONS RELAY DEMONSTRATION *will help mature concepts and deliver technologies applicable to both near-Earth and deep-space communication network mission*

TRACKING AND DATA RELAY SATELLITES provides a multitude of communications services to a wide variety of missions, studying everything from our own ever-changing Earth to the deepest depths of space

SPACE NETWORK GROUND SEGMENT SUSTAINMENT *will implement a flexible and extensible ground segment that will allow the Space Network to maintain high levels of service in the future, accommodate new users and capabilities*

…as well as operation of the NASA Near Earth Network and Space Network

LINE OF BUSINESS OVERVIEW: *PROVIDE SPACE OPERATION SERVICES AND NEW TECHNOLOGY TO ENABLE SCIENTIFIC DISCOVERY, RESEARCH, AND COMMERCIAL SPACE DEVELOPMENT; DIRECTLY CONNECTS EXPLORERS TO THEIR INSTRUMENTS*

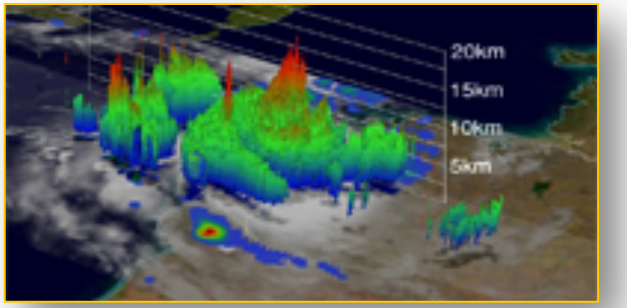
TECHNOLOGIES: ADVANCED COMMUNICATIONS AND NAVIGATION; SPACE NETWORK; DEEP SPACE NETWORK; NEAR EARTH NETWORK

FPD PORTFOLIO

EARTH SCIENCE LINE OF BUSINESS

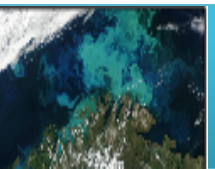
ICE, CLOUD, AND LAND ELEVATION SATELLITE will continue the important observations of ice-sheet elevation change, sea-ice freeboard, and vegetation canopy height that begun by ICESat in 2003

GLOBAL PRECIPITATION MEASUREMENT mission is an international network of satellites that provide the next-generation global observations of rain and snow. The GPM Observatory enables more accurate global precipitation measurements within
3 hours, for scientific research and societal applications



EARTH SCIENCE DATA AND INFORMATION SYSTEMS project improves the quality of science data services, processes, and delivery of data products to enable NASA's Earth science objectives to improve the understanding of our home planet

…as well as many operating missions including Landsat and the Earth Observing System



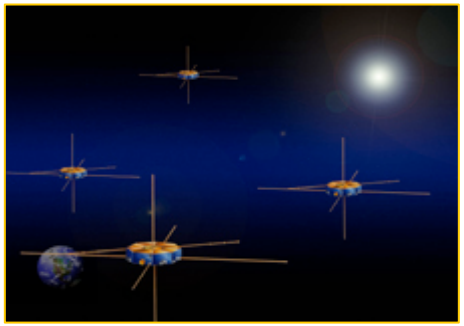
LINE OF BUSINESS OVERVIEW: MISSION DEVELOPMENT AND MANAGEMENT THAT ADVANCE UNDERSTANDING OF EARTH; DEVELOPING TECHNOLOGIES NEEDED TO OBSERVE AND UNDERSTAND CHANGES IN EARTH'S CLIMATE SYSTEM
TECHNOLOGIES: STATE-OF-ART REMOVE SENSORS; AIRCRAFT-BASED OBSERVATIONAL PLATFORMS; SURFACE-BASED OBSERVATIONAL PLATFORMS

FPD PORTFOLIO

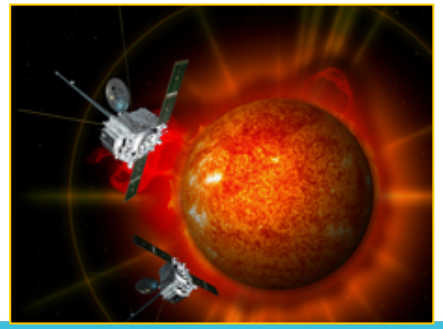
HELIOPHYSICS LINE OF BUSINESS

-Understanding and Living with Our Star-

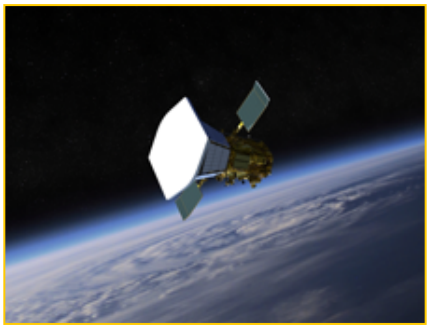
*The **MAGNETOSPHERIC MULTI-SCALE** Mission will use four identical spacecraft, variably spaced in Earth orbit, to make three-dimensional measurements of magnetospheric boundary regions and examine the process of magnetic reconnection [**SOLAR TERRESTRIAL PROBES PROGRAM**]*

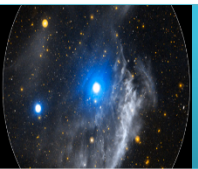


SOLAR TERRESTRIAL RELATIONS OBSERVATORY *(STEREO) traces the flow of energy and matter from the Sun to Earth as well as reveal the 3D structure of coronal mass ejections and help us understand why they happen. Also provides alerts for Earth-directed solar ejections, from its unique side-viewing perspective adding it to the fleet of Space Weather detection satellites [**SOLAR TERRESTRIAL PROBES PROGRAM**]*



***SOLAR PROBE PLUS** will study how the Sun's corona is heated and how the solar wind is accelerated [**LIVING WITH A STAR PROGRAM**]*



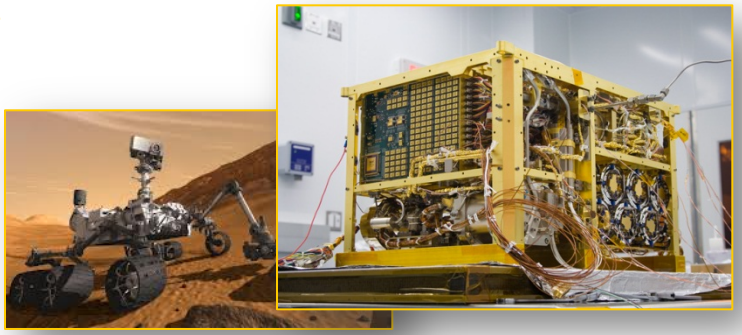


***LINE OF BUSINESS OVERVIEW:** MISSION DEVELOPMENT AND MANAGEMENT FOR STUDY OF SOLAR STRUCTURE AND MAGNETIC ACTIVITY, SOLAR WIND, SOLAR DISTURBANCES, AND THE EFFECTS ON THE EARTH'S UPPER ATMOSPHERE*

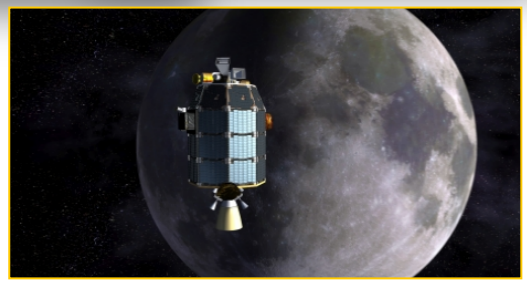
TECHNOLOGIES: STREAMLINED EXPLORER DEVELOPMENT (HUMAN AND ROBOTIC EXPLORERS); HELIOPHYSICS SYSTEM OBSERVATORY; REMOTE SENSORS

FPD Portfolio

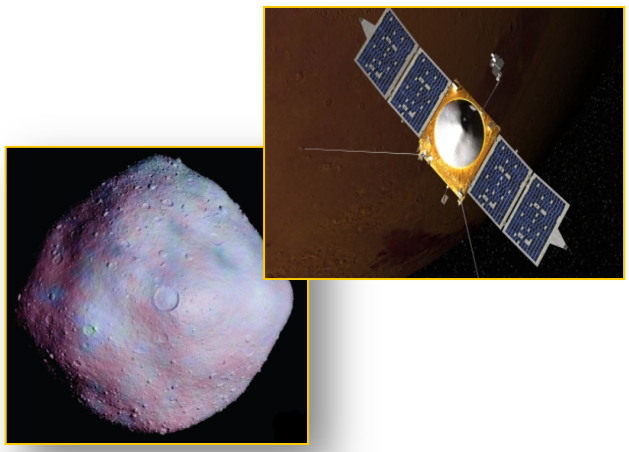
Planetary and Lunar Line of Business



The **Mars Rover** landed with the **Sample Analysis at Mars "SAM"** Instrument, the most sophisticated instrument suite ever to probe another planet's surface in search for clues to life



Lunar Atmosphere and Dust Environment Explorer "LADEE" robotic mission determines the global density, composition, and time variability of the fragile lunar atmosphere before it is perturbed by further human activity



Mars Atmosphere and Volatile EvolutioN "MAVEN" will orbit Mars to determine the role that loss of volatiles from the Mars atmosphere to space has played through time, exploring the histories of the atmosphere and climate, liquid water, and planetary habitability

Origins Spectral Interpretation Resource Identification Security Regolith Explorer "OSIRIS-REx" *mission will collect and return a sample from an asteroid to help investigate planet formation and the origin of life, as well as impacts of asteroids on Earth*

Line of Business Overview: *Mission development and management for new scientific measurements to explore the solar system [planets (atmospheres, surfaces, and interiors); asteroids; origins of planets (physical processes)]*

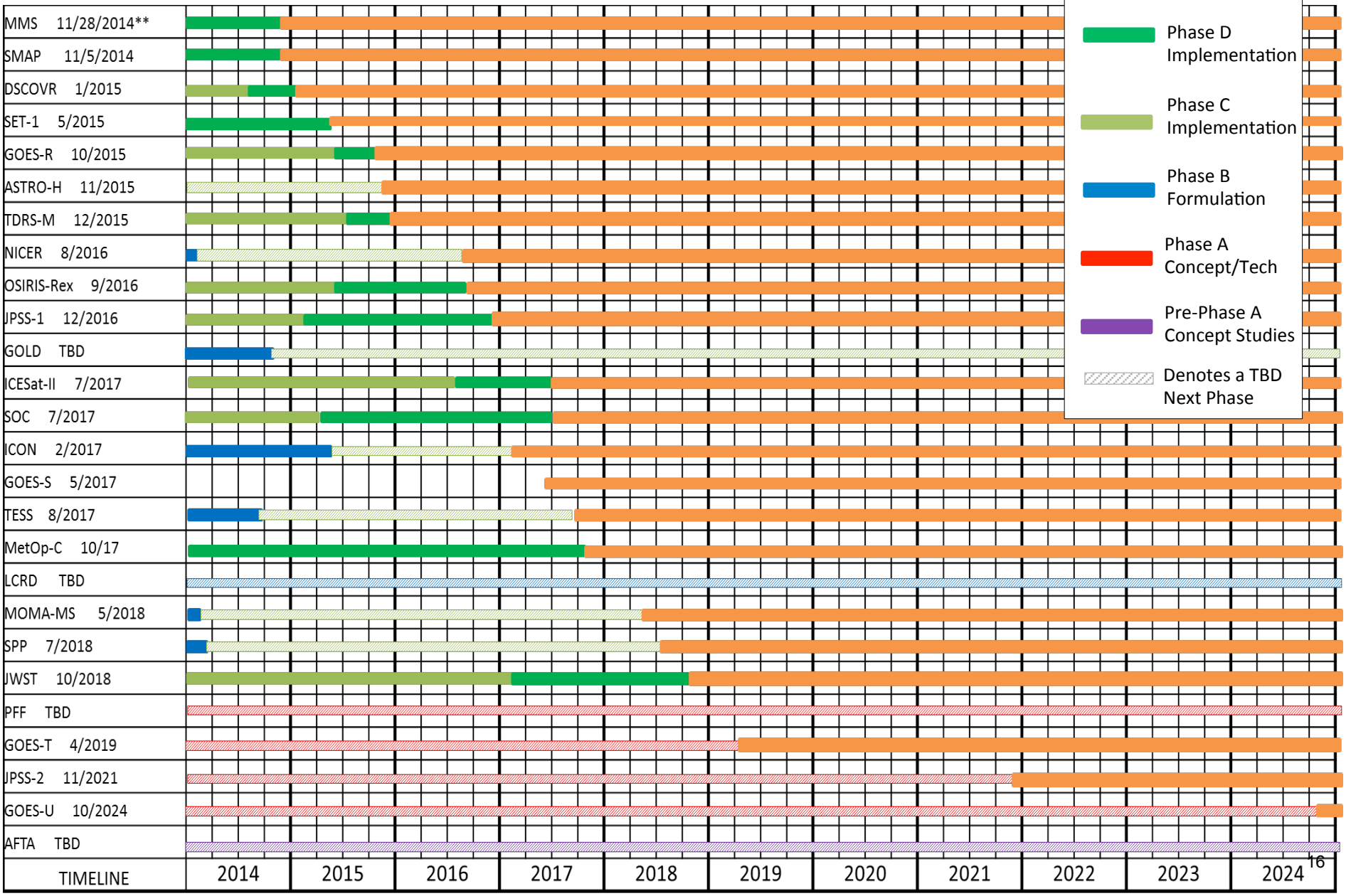
Technologies: Instrument for Landers; Orbiting Spacecraft

GSFC Flight Projects' Mission Horizon

(as of 3.5.2014)

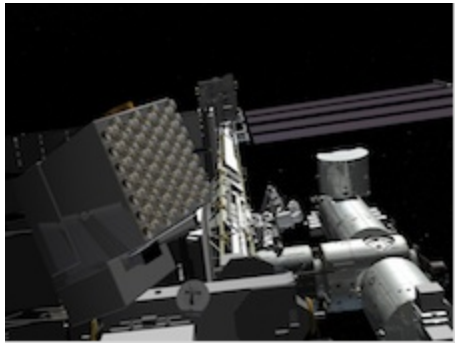
** Indicates In-house Mission

NOTE: Missions in Phase B have a TBD Phase C for TBD Phase D Start



CONCLUSION

NEW OPPORTUNITIES

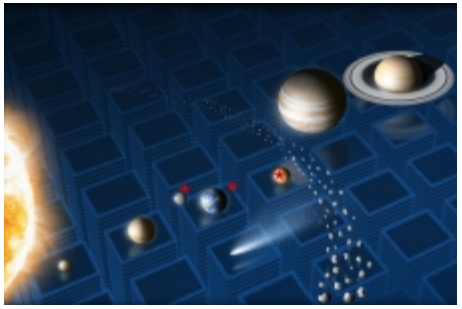


Class D Missions

Pioneer project management approach that optimizes mission implementation and development. Approach provides an opportunity to improve cost, schedule, and threshold performance by efficient, targeted use of resources

Next Generation Workforce

Flight Projects Development Program trains future project management personnel to meet the specialized, diverse, and challenged requirements for the future of flight projects



Planetary Science

Ongoing proposals address quests to understand human origins by strategizing new business opportunities for planetary science, a line of business that is new to Goddard

GSFC Flight Projects is recognized globally as being world class in mission development and execution of projects

Source: GSFC Code 100 Compendium